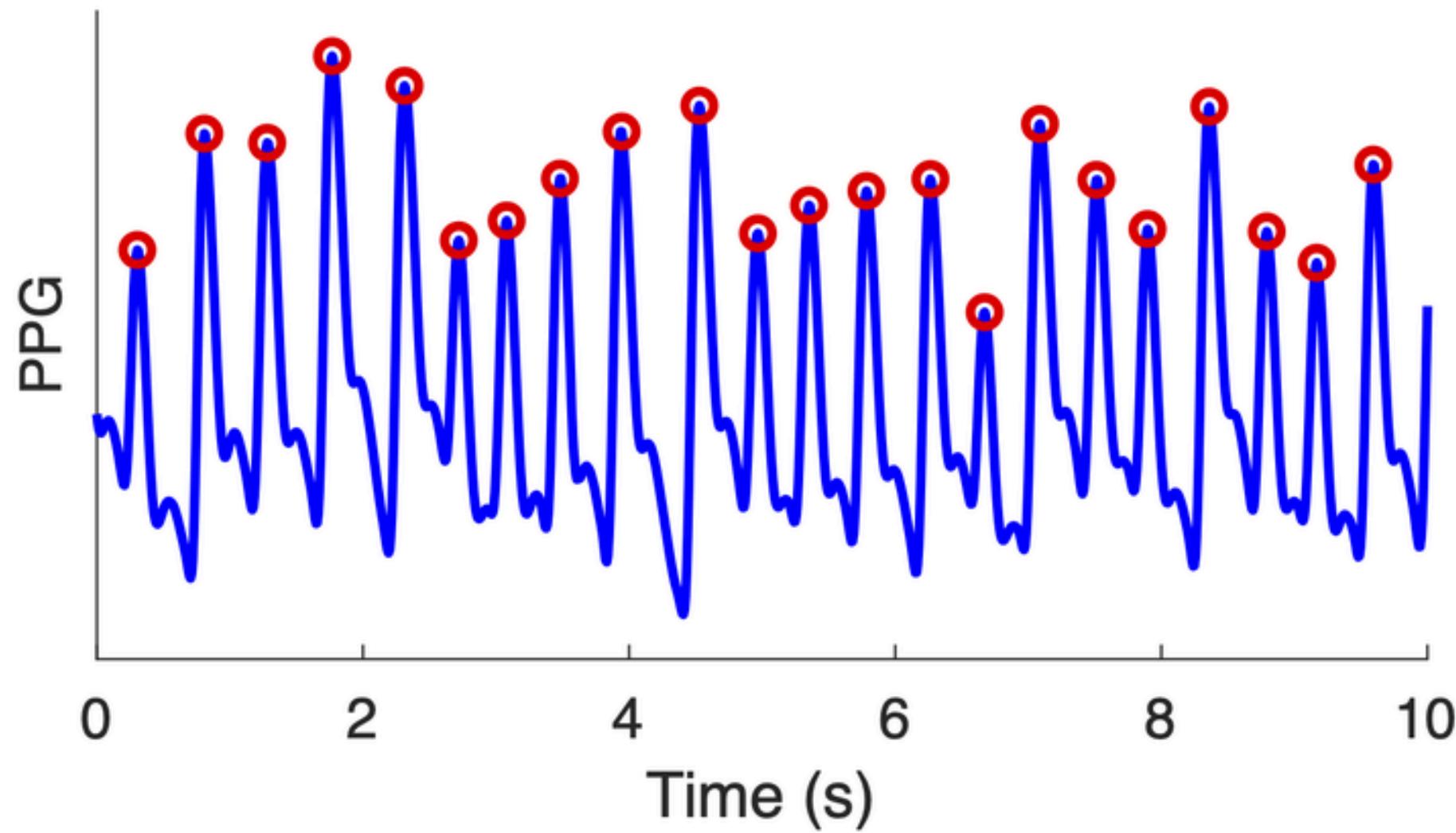


HR ESTIMATION FROM PPG



Peak Detection



$$d_i = p_{i+1} - p_i$$

$$\bar{d} = \frac{1}{K-1} \sum_{i=1}^{K-1} d_i$$

$$T = \frac{\bar{d}}{f_s}$$

$$HR = \frac{60}{T} = \frac{60f_s}{\bar{d}}$$



HR ESTIMATION FROM PPG

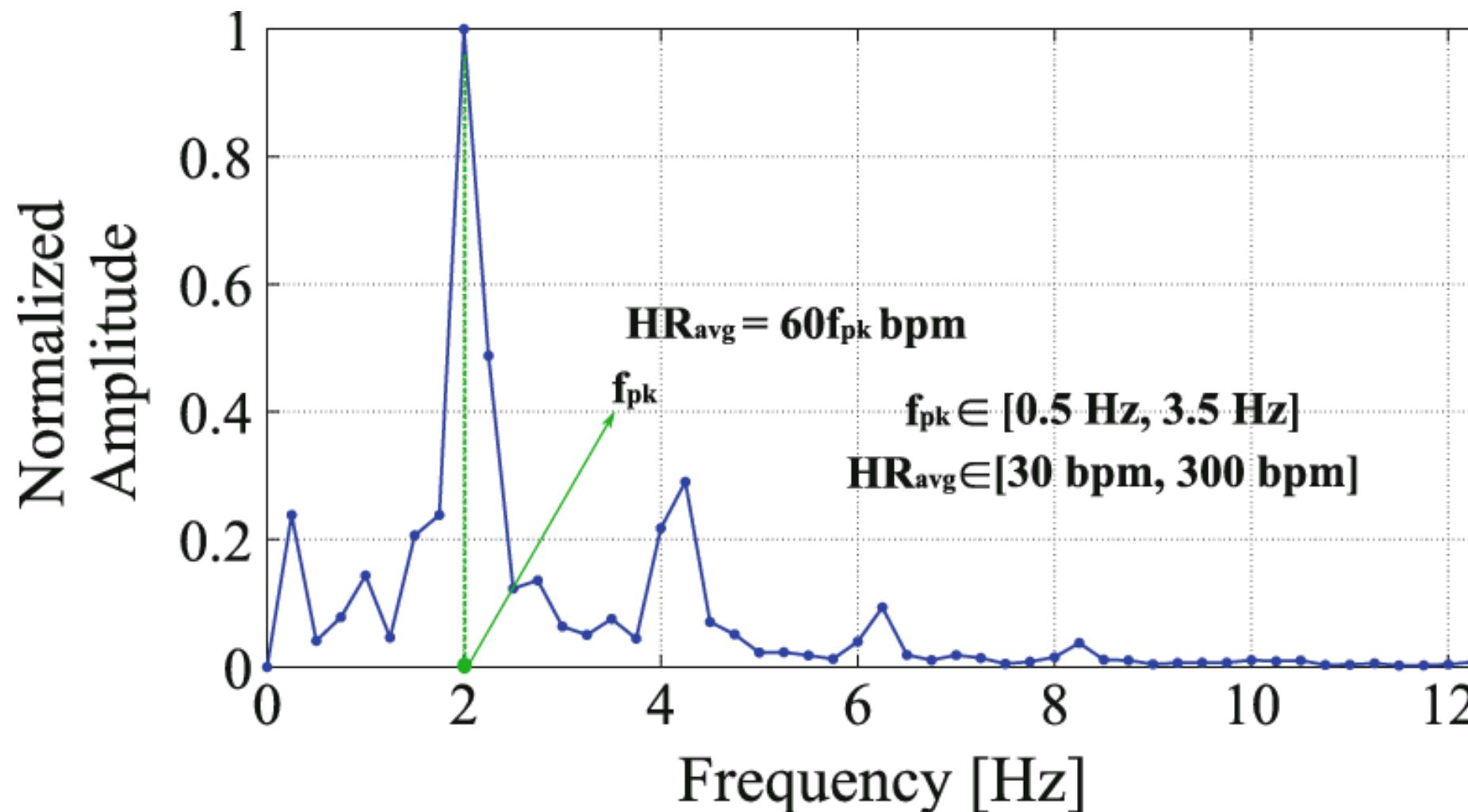


rPG - PhysNet	rPPG - PhysMamba	PPG
117.35	110.82	110.84
108.16	106.49	105.88
131.26	127.55	127.55
127.11	92.33	90.30

HR ESTIMATION FROM PPG



Fast Fourier Transform



$$X[k] = \sum_{n=0}^{N-1} x[n] e^{-j2\pi kn/N}$$

$$f_k = \frac{k f_s}{N}$$

$$f_{HR} = \arg \max_{f_k \in [f_{low}, f_{high}]} |X[k]|$$

$$HR = 60 \cdot f_{HR}$$

HR ESTIMATION FROM PPG



rPG - PhysNet	rPPG - PhysMamba	PPG
119.53	119.53	119.53
108.98	108.98	108.98
133.59	133.59	133.59
91.41	91.41	91.41

- Video length → 30 s
- Sample rate → $fs = 30 \text{ Hz}$
- Sample size → $30 \times 30 = 900 \rightarrow N = 1024$
- Frequency resolution → $\Delta f = fs/N = 30/1024 = 0.03$
- HR resolution → $\Delta HR = 0.03 \times 60 = 1.8 \text{ bpm}$
- Max estimation error → $e = \Delta HR/2 = 0.9 \text{ bpm}$

RR ESTIMATION FROM PPG

1. XIAO ET AL. (2020), "EXTRACTION OF RESPIRATORY SIGNALS AND RESPIRATORY RATES FROM THE PHOTOPLETHYSMOGRAM"

STEP 1: EXTRACT RESPIRATORY-MODULATED SIGNALS FROM PPG

- RIAV (AMPLITUDE VARIATION)
- RIFV (FREQUENCY VARIATION)
- RIIV (INTENSITY VARIATION)

STEP 2: IMPROVE SIGNAL QUALITY USING SIGNAL QUALITY INDEX (SQI)

STEP 3: APPLY AUTOCORRELATION (AC) → FIND PERIODICITY OF BREATHING

STEP 4: APPLY AUTOREGRESSIVE (AR) MODEL → REFINER FREQUENCY ESTIMATE

STEP 5: FUSE RESULTS FOR ROBUST RR PREDICTION

OUTCOME REPORTED: ACHIEVED <3.72% ERROR ON CAPNOBASE DATASET.

· **PREPROCESSING → PEAK DETECTION → AC → AR → FUSION → RR**

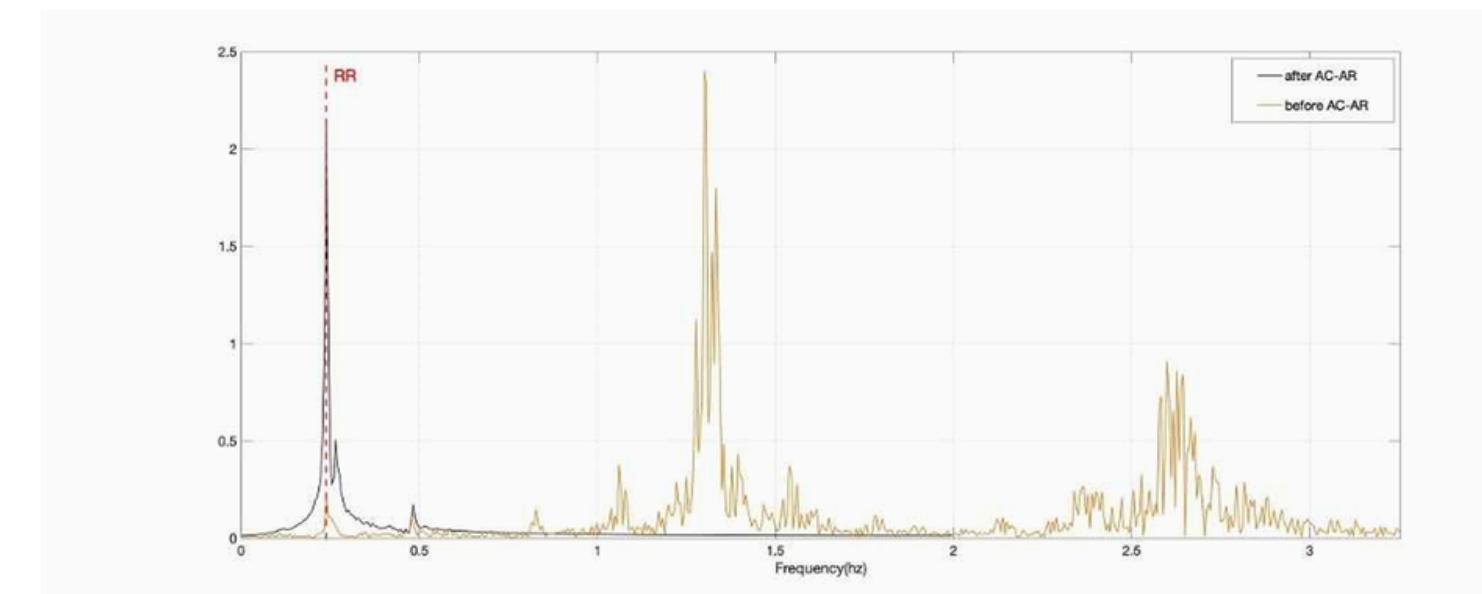


Fig. 8. The frequency spectrum of 180s respiratory signal before AC-AR (yellow) and after AC-AR (black). The red dotted line is the respiratory rate.

JAUNDICE DETECTION

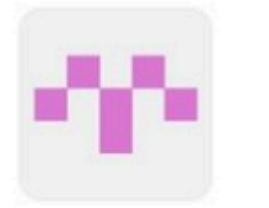
MobileNet v5

- Lightweight & efficient → optimized for mobile/edge devices, ideal for smartphone-based medical apps.
- Tested with MobileNetV5 backbone as the classifier for jaundice detection.
- Need to Fine-tune to adapt to jaundice vs. non-jaundice classification
- Tested inference on sample facial images to evaluate detection capability.

ROI SELECTION

- Detect forehead and cheeks
- Mediapipe 468-point facemesh
- landmarks 234–243 => left cheek
landmarks 454–463 => right cheek
landmark 1–5, 152–159 => forehead
- suitable for mobile applications

google-ai-edge/
mediapipe



Cross-platform, customizable ML solutions for live
and streaming media.

91
Contributors

39k
Used by

31k
Stars

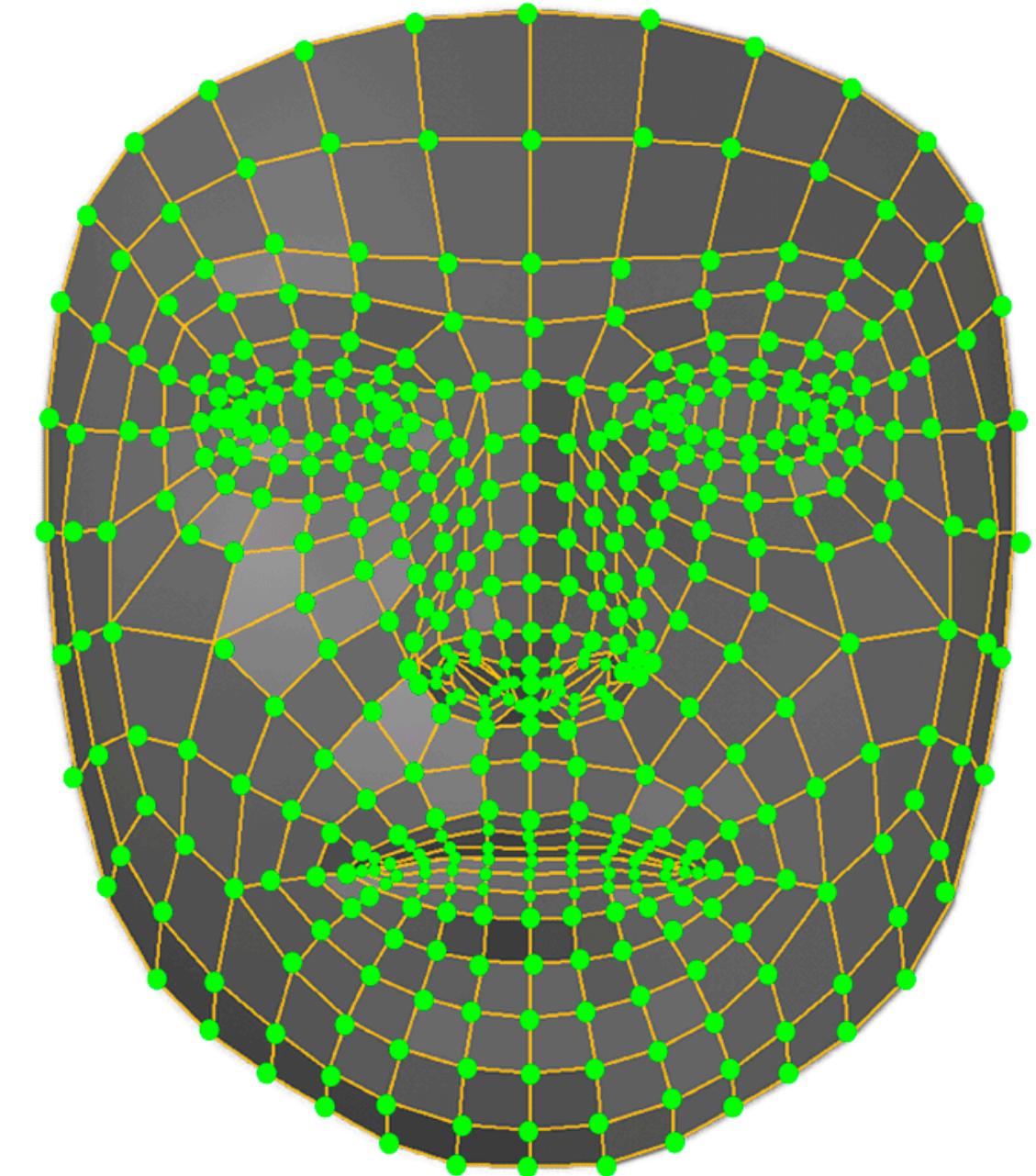
6k
Forks



MediaPipe Face Mesh

Cross-platform, customizable ML solutions for live and streaming media. -
google-ai-edge/mediapipe

GitHub



<https://github.com/google-ai-edge/mediapipe/wiki/MediaPipe-Face-Mesh>



ISSUE IN GPUS

- Pamuditha aiya mentioned that when running Mamba models , the servers tend to crash due to an incompatibility with cuda. He has faced the difficulty of restarting them at midnight. He asked us resolving that would be helpful for him.
- After a discussion with Deependra aiya , we found out that the issue occurs when running PhysMamba model on cuda 1 GPU. We have to avoid doing that.

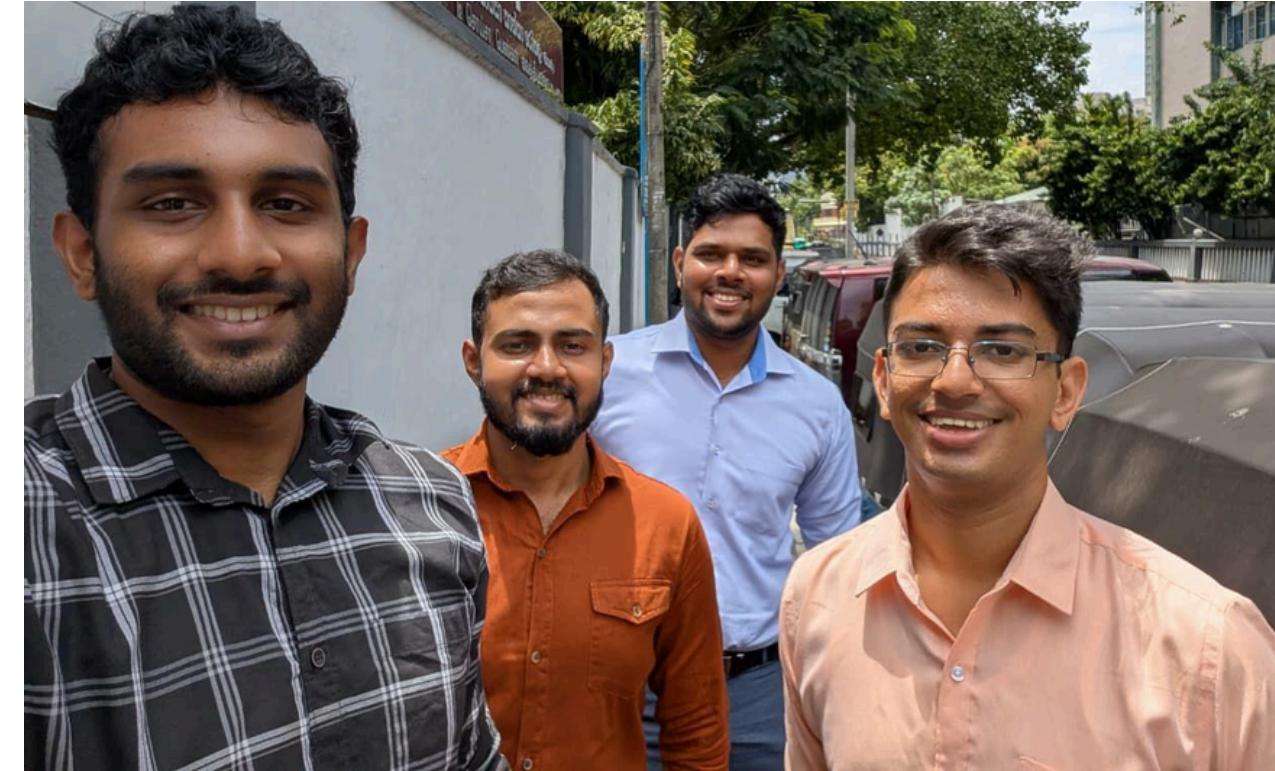


IMPORTANT POINTS PROF.ANUSHA MENTIONED

- Focus on a specific part rather than doing several things.
- Focusing more on technical novelty is good for Engineering students.
- For privacy preserving, processing everything ondevice would be difficult.
- Homomorphic encryption could be a good option.
- Start writing the paper before the thesis
- Contact Prof.Jagath Rajapakshe(SMU) for supervision.



ETHICAL CLEARANCE - HOSPITAL



- Ethical clearance given.
- Asked us to make some minor changes in Information Sheet and Consent Form.
- Asked to combine both and get signs in every page
- Raised the issue that how accuracy in jaundice visual test increase since we use human measurements for training
- Asked us to focus on privacy of data since mothers may concern about it more.